

An Evaluation of Online Distance Learning Programmes through the Lens of Students' Expectations

Karen Clark, Marija Cubric and Mariana Lilley
University of Hertfordshire, Hatfield, UK
k.clark@herts.ac.uk,
m.cubric@herts.ac.uk ,
m.lilley@herts.ac.uk

Abstract

As the University of Hertfordshire (UH) moves towards its goal of 15% distance learning by 2015, it has become increasingly important to gain a deeper understanding of the needs and expectations of our growing population of distance learners, and how these compare to the institutional agenda.

The purpose of our research is to analyse and compare student, staff and institutional views and expectations of distance learning programmes in three different Schools: School of Law, Business School and School of Computer Science. These Schools have adopted different models of study and support. Their programmes attract a diverse population of learners from across the globe; these include those living close to the University and juggling paid work with study, ex-pats, new graduates looking to enhance their CVs and international students seeking a UK qualification.

The focus of this paper is on student views, and our findings are supported with quantitative and qualitative data from student surveys (N=89).

The results confirm findings from the literature with regards to the importance of flexibility and time-management for online distance learners, but they also indicate some additional implications for learning designs and institutional processes related to Online Distance Learning (ODL), such as further customization of learning designs for specific types of learners, increased 'tutor presence' and more opportunities for social inclusion of distance learning students into the wider university.

Keywords (5-10): higher education, Online Distance Learning (ODL), learning design, teaching presence, social presence

1. Introduction

The work presented here is part of an ongoing programme of research into understanding students' expectations and needs in an ODL context, and how these compare to the views of academic staff and the wider University. Ultimately, it is intended that findings from this research will identify lessons learned as well as support the University in devising strategies for embedding effective pedagogy into new and existing ODL programmes.

In previous work conducted by the authors (2011), the pedagogical approaches underpinning three different ODL programmes at the UH were analysed and compared. In that work, the views of academic staff from the School of Law, Business School and School of Computer Science were the main point of interest. Here, the focus is on students' views and expectations of ODL.

For the purposes of this work, we adopt the definition of ODL proposed by White et al. (2010) that is, 'any course, at any HE academic level, delivered to students at a distance from the host institution, which has a significant component delivered to students online'.

The students who volunteered to share their views were studying on one of the following ODL programmes: Graduate Diploma in Law, MSc Strategic Business Information Systems, BSc Honours Computer Science (direct entry to final year only), or MSc Honours Computer Science. A brief introduction to these programmes is provided below.

The Graduate Diploma in Law (GDL) is a small programme which has been running full-time since 2008. It is for students with a first degree in a different discipline wishing to pursue a professional career as a solicitor or barrister. Distance and campus students are registered on the same cohort. Face-to-face workshops are audio recorded and are made available through the University's proprietary MLE (StudyNet) along with documentary resources. An increasing range of online activities has been adopted to build the distance community including small group research, wiki development use of discussion boards and webinar presentations. The programme runs full-time over one year or part-time over two. Individual modules may be picked up by students who have non-qualifying law degrees – and distance learning is popular with this group. Most students are based in the UK fitting studies around full time work but the programme has also been pursued by individuals in Hong Kong, Japan, North America and the Caribbean. Distance learners form about one third of the cohort and so far 23 have graduated from the full programme, with as many more engaged with

individual elements.

The Business School's MSc Strategic Business Information Systems (MSc SBIS) course is offered to students who have successfully completed the NCC Education Postgraduate Diploma in Strategic Business IT as a 'top-up' 60-credit programme that is made up of a Research Methodology unit and a Dissertation. Each student works through the dissertation at his or her own pace, with one-to-one online supervision. The Research Methods module is supported by StudyNet with purposely designed online materials, and wiki-based weekly activities. Supervision is carried out using Skype and Elluminate sessions. The student population comprises of mainly international students from Malaysia, Nigeria, South Africa, and Singapore. Since its inception in 2009/10, 61 students have graduated on the programme.

In the case of the online BSc Honours Computer Science programme of study, this paper focuses on our top-up route to a BSc degree (i.e. direct entry to final year) for holders of an HND, IMIS Higher Diploma, Foundation Degree, or equivalent qualifications. The student population is derived from over thirty different countries across the world, including: United Kingdom, Ghana, Malta, Nigeria, Trinidad & Tobago and Zimbabwe. The online programme mirrors the final year of its campus-based counterpart. The learning materials and activities available to the ODL students have been developed with multi-modal delivery in mind, as described in Pyper et al. (2009). Most of the tuition is asynchronous, to offer greater flexibility to our students, who tend to be mature, in full-time employment and geographically disperse. The use of the MLE is supplemented by a suite of applications, including Adobe Connect, Turnitin, QuestionMark Perception, Skype, BlueBerry, YouSendIt and VitalSource Bookshelf. Since its inception in 2004, over 1,100 students have graduated on our BSc programme.

The online MSc Honours Computer Science programme of study was created in 2007 and it follows the same pedagogical and technological approaches to the online BSc programme.

In both Computer Science programmes, there are two different modes of delivery: ODL and tutored e-learning. Tutored e-learning students have access to the same online facilities and resources, but also receive local tutor support from staff at a partner institution.

The rest of the paper is organized as follows. We start with a review of the literature and methodology in sections 2 and 3 respectively. This is followed by a summary of findings and relevant discussion (section 4) and conclusions (section 5).

2. Literature Review

As Higher Education in UK comes to terms with the post-Browne landscape and global economic crisis, distance learning is attracting attention as a potential path to a cost-effective 21st century future. It seems to have the promise of a route around Higher Education Funding Council for England (HEFCE) funding restraints, a way to widen participation and show that institutions can make the most of the information revolution. White et al (2010) found 113 HE and FE providers offering more than 1,500 online/distance courses and keen to expand provision.

Lentell (2012) describes the current situation in traditional UK institutions as by and large 'a cottage industry run by beleaguered enthusiasts'. It has been bolted onto long-established practices without clear institutional understanding of the need for a distinct student-centred distance learning pedagogy. If it is to deliver efficiently the benefits and scalability which technology seems to promise a clearer vision is needed.

White et al (2010) note that it is now commonplace to acknowledge that successful development of online learning is not all about the technology: the centrality of pedagogy is accepted and the challenge is seen as 'the configuration of the supporting infrastructure, resources and business models required.' For the purpose of our work on initial students expectations it is interesting to note that it also observed: 'More information on the provenance, motivations and aspirations of this student body should be sought...'

Collaborate to compete (2011), HEFCE's Online Learning Task Force report, echoes the call for a strategic sector-wide response, for training, investment, leadership and vision and a move away from bolt-on provision.

The whole-institution perspective is reflected in literature reviews. Back in 1996, Sherry in her literature review, identified multiple issues, some of which are still present:

- Design considerations: such as interactivity, active learning, visual imagery, effective communication
- Methods and strategies, such as, guided practice, media based challenges, inquiry learning, teamwork

- Distance learners aims and goals, models of learning, factors influencing success and learner support
- Operational issues, such as the teacher-facilitator-student triad and technology adoption
- Management and policy issues, such as team personnel, scheduling and cost/benefit tradeoffs

Jung (2012) has identified a failure to give learners' views weight alongside the perspectives of institutions, funding and assessment bodies in consideration of quality in distance education. She proposes a 'whole system' model for quality in distance education in Asia over three domains: supportive, pedagogical and environmental. Within these are 10 dimensions: faculty support, student support, information and publicity, interactivity, institutional quality assurance, institutional credibility, course development, teaching and learning, evaluation and assessment and infrastructure. Her study noted significant gender differences in perception across all 10 dimensions. Choosing to draw her conclusions specifically for Asian learners demonstrates a presupposition that geographical and cultural context is critical.

Garrison's et al. (2000) 'community of inquiry' model (CoI) has also been highly influential as a framework for understanding online distance education. It proposes educational experience as a product of the interaction of three overlapping elements – cognitive presence, teaching presence and social presence. More recently Shea et al (2010) have suggested the addition of learner presence would enhance the model through analysis of the self-regulatory performance of online learners. Annand (2011) has suggested the role of social presence in online higher education has been overstated because empirical studies indicate that it does not have an important impact on cognitive presence. He casts doubt for example on the CoI assumption that sustained two-way communication is a necessary feature of effective online learning.

Even though the literature reveals that quality distance learning is a function of the entire Higher Education institution, at the heart of the transaction is the classroom – as Osika (2006) notes 'the core of all distance learning courses is the faculty who teach them.' She identifies four key elements of faculty support: technological skills, accessible equipment, knowledge about online pedagogy and motivation.

3. Methodology

In this work, we make use of both quantitative and qualitative data from students involved in distance learning programmes in three different schools (Law, Business and Computer Science). For the purpose of data collection we consider a snapshot in time taken by volunteer participants in an online survey launched to new and returning students in October 2011, one month after the start of studies.

The questionnaire included 29 questions spread across different sections; these included: standard demographic questions; questions about the students' experiences with learning technologies; questions about their views of learning design considerations, learning methods and strategies and open questions relating to perceived benefits and challenges of ODL and expectations of their chosen programmes.

Three out of the 29 questions (corresponding to 12 statistical variables) were concerned with students' personal attitudes to work and learning, as well as design considerations and methods that they thought were important for effective distance learning; these 3 questions employed a 5-point Likert scale so students could rate the extent to which they agreed/disagreed with the statements presented. The questionnaire was based on existing literature on distance learning and, in particular, we considered Sherry's (1996) categorization of issues in distance learning, Merisotis' and Phipps' (1999) attributes of successful distance learning implementation, and critical success factors for distance learning from Osika's (2006) concentric support model. We also considered Chickering and Gamson's (1987) principles of good teaching practice as they are frequently included in criteria for evaluating distance learning modules (Graham et al., 2001; Billings et al., 2001).

The total number of respondents was 89, a response rate of 18.7%. The response rate was calculated relative to the total number of students (476) starting their distance learning programmes in three schools in Autumn 2011.

Despite unequal distribution of responses across schools (**Table A**) we are considering all data, as we are primarily interested in initial views of students which at the time of launching the survey were still un-affected by the specific differences in delivery and presentation of distance learning on different programmes. Also, number of responses per school is proportional to the size of the groups.

Table A

Programme	Total (N)	Total (%)	Responses (N)	Responses (%)	Response rate (%)
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GDL	24	5%	6	7%	25%
SBIS	26	5%	2	2%	8%
BSc CS	309	65%	58	65%	19%
MSc CS	117	25%	23	26%	20%

4. Findings

Quantitative analysis was performed using SPSS v.19 and supplemented by qualitative analysis of student responses to three open-ended questions. In all three cases, responses were summarised, and then based on semantic similarity, structured into different categories. Tables F and G in Appendix B show the categories emerging from students responses to the open ended questions.

4.1. Demographic data

The age and gender breakdowns are shown below.

Table B

Age	GDL	SBIS	BSc CS	MSc CS	Total
21 or under:	1	0	9	0	10 (11.2%)
22 to 34:	0	1	29	15	45 (50.6%)
35 to 44:	4	1	17	5	27 (30.3%)
45 to 54:	1	0	3	1	5 (5.6%)
55 to 64:	0	0	0	1	1 (1.1%)
65 or Over	0	0	0	1	1 (1.1%)

Gender	GDL	SBIS	BSc CS	MSc CS	Total
Female	5	0	20	3	28 (31.5%)
Male	1	2	38	20	61 (68.5%)

52.8% of the students were single. Students were based in 13 different countries most notably Trinidad and Tobago (46%), Malta (20%) and the UK (18%).

For 78% of students this was the first time studying an online distance-learning course. Two students have studied traditional ("correspondence") distance learning course before but not ODL.

11% of students have a higher degree already (MA or higher), 38% already have Bachelor degree, and 36% have an equivalent of NVQ levels 4-5.

68% of students use entirely their own income to fund their studies.

Only 13.5% of students were not employed, and those employed work in 13 different sectors, mostly in IT (40%), education (19%), business, accountancy or financial services (15%).

Regarding the job seniority, 49% are in junior roles, 40% in senior and further 7% in executive roles.

4.2. Reasons for studying online and importance of completing the degree

The main reasons for enrolling on their current programmes were to enhance career prospects (45%), interest in subject (34%), or to formalise existing industry experience (19%).

The main reasons for studying online were work commitments (45%), personal commitments, such as caring for someone (24%), prohibitive cost of studying in UK (21%), a wish to study at own pace (14%), and in some cases combinations of these factors.

83% of students agree or strongly agree (57%) that the consequences of not completing the degree would be serious for them.

4.3. Technology

85% of respondents rate their IT skills above average and of these 40% consider themselves IT experts. This figure is clearly discipline sensitive and reflects the fact that students on the Computer Science made up the majority of the respondents. The law component showed five of the six were average or novice users.

Internet access varies, and includes combination of broadband (71%), wi-fi hotspots (46%), mobile internet (30%) and for a small percentage of respondents (4%) dial-up or ISDN service.

Regarding the use of internet applications, 52% of students use Facebook daily, while Twitter, LinkedIn, GoogleTalk and MSN are never used by 70%, 63%, 58%, 46% of students respectively. YouTube is used daily or weekly by 75% of student population. The frequency of Skype usage is equally distributed across responses: never, monthly, weekly or daily.

4.4. Personal attributes

Regarding the personal attributes, 86% believe that they have a successful track record on taking on new projects and challenging tasks, 89% believe they will be successful on the new programme, and 77% rate highly their time-management and organizational skills.

It is interesting to note that, in spite of self-reporting good time management skills, students nevertheless reported time management as one of the challenges of studying online.

4.5. Learning design considerations

The most important e-learning features for effective learning are use of visual imagery and media files in course materials (92%), interactive features such as online tests and simulations (88%) and communication features such as email, discussion boards, chats (87%). Awareness mechanisms (i.e. knowing who is learning online) was not highly valued by the participants, with 38% of respondents not having an opinion about it, indicating perhaps that the participants did not understand the question. The most important learning and teaching methods for effective learning are challenging tasks (89%), tutor-led activities (88%), problem-based tasks (87%) and less so computer-based tasks (71%), and collaborative learning tasks (60%). It is notable that 43% of the students reported a preference for cooperative over individual tasks. This trend in the data is largely accounted for by students from Trinidad & Tobago, whose ODL studies are supplemented by tuition at a local college (tutored e-learning). This is shown in more detail in Table C.

Table C

Country	Cooperative	Individual	Total
Malta	6	12	18
Trinidad & Tobago	24	17	41
UK	3	13	16
Other	6	8	14
Total	39	50	89

Opinions are divided regarding the most important factor influencing effectiveness of distance learning, among those who think this is the ability to work independently (36%) and those who rely on guidance from tutor (35%). Active listening and reading (15%) and cooperation between students (10%) are considered less important. This seems somewhat inconsistent with the high preference for cooperative learning, indicating perhaps that students, despite preferences for cooperative learning, consider individual 'time on task' as the most important indicator of effective learning, and see less value for learning in cooperation with others.

4.6. Expectations

During their distance learning course, students expect to engage with a variety of activities, mostly with reading (98%), researching (91%), completing exercises (91%), participating in discussion forums (75%), watching multimedia presentations (71%), interacting with simulations (60%) and answering online quizzes (57%). Fewer students expect to contribute to wikis (19%), participate in webinars (26%) and learn through using animations (35%).

Almost half of the students (49%) expect to study between 10-15 hours per week per module, and 36% expects to spend more than 15 hours per module.

All students expect a response to emails or discussion posts within 2-3 days, with 63% and 65% respectively expecting responses within 24 hours.

Feedback from tutor on assignments is expected within 2-3 weeks (91%).

4.7. Types of distance learners

In order to reduce multiple observed variables relative to design considerations into fewer factors that summarize their variance and potentially discover some unobservable properties of the sample, a principal axis factor analysis was conducted on 11 variables corresponding to students' views on learning design considerations for effective distance learning (section 4.1.5) with orthogonal rotation (varimax). The sample size was adequate for performing a factor analysis with a Kaiser-Meyer-Olkin measure of 0.767 (good, according to Field, 2009). The analysis was run to obtain factors that had eigenvalues greater than 0.9; 3 were found that explained 62.8% of the variance.

Table D¹: Rotated Factor Matrix^a

	Factor		
	1	2	3
Problem-based tasks	.842		
Challenging tasks	.828		
Automated (computer-based) tasks	.467	.369	
Use of visual imagery		.684	
Interactive Features	.413	.670	
Awareness Mechanisms		.518	
Communication Features		.469	
Tutor-led tasks		.391	
Teamwork and collaborative learning tasks			.675
Preferred learning style (cooperative)			-.509

Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Results in Table D suggest existence of three different types of online learners with regards to preferred learning style and teaching approach:

- Individual learning style, problem-based approach
- Individual learning style, tutor-led approach with the use of rich media and interactive features
- Teamwork, collaborative learning tasks.

Whilst Jung's (2012) work found significant gender effect in perception of quality in distance education (including consideration of individualized or collaborative activities) and Poellhuber and Anderson (2011) noted an age effect on learning preference, we observed no real difference between the 3 factors with respect to gender, age or marital status. It is quite likely that this is due to the data been highly variable by nature and the sample sizes were not sufficient to overcome this.

4.8. Significant Correlations

Pearson's Chi Square test of independence was performed on a set of selected nominal variables, with the intent to further explore the nature of the association between the preferred learning style (cooperative vs. individual) and demographic attributes.

Due to a large percentage of cells that had expected frequencies <5, the test failed to detect any genuine effects for all but two variables: level of IT skills ($\chi^2(3)=5.554$, $p<0.05$) and level of study ($\chi^2(1)=8.013$, $p<0.01$), which both had a significant association with the preferred learning style.

In other words, a higher proportion of 'computer experts/IT professionals' prefers individual over cooperative tasks, compared to students with less advanced IT skills, with 'odds' 1.5 times higher for computer experts/IT professionals.

Similarly, the odds that a Master-level student prefers individual tasks are 4 times higher than for undergraduate students.

Poellhuber and Anderson (2011) found that older students expressed a marked preference for individual learning. They also noted, surprisingly perhaps, that cooperative preferences were higher for men than women. However, 38.4% of all students they surveyed were interested or very interested in collaborating with peers, a preference which actually increased with age in ODL courses.

Spearman's correlation test were performed on the remaining set of ordinal variables, resulting in some significant (1-tailed) associations ($p<0.01$) summarized in Figure 1, with negative correlations being shown as dotted lines. For simplicity reasons, internal correlations identified in the factor analysis (section 4.7. and Appendix A) are not displayed, and instead they are shown by blue 'clouds' in the figure below.

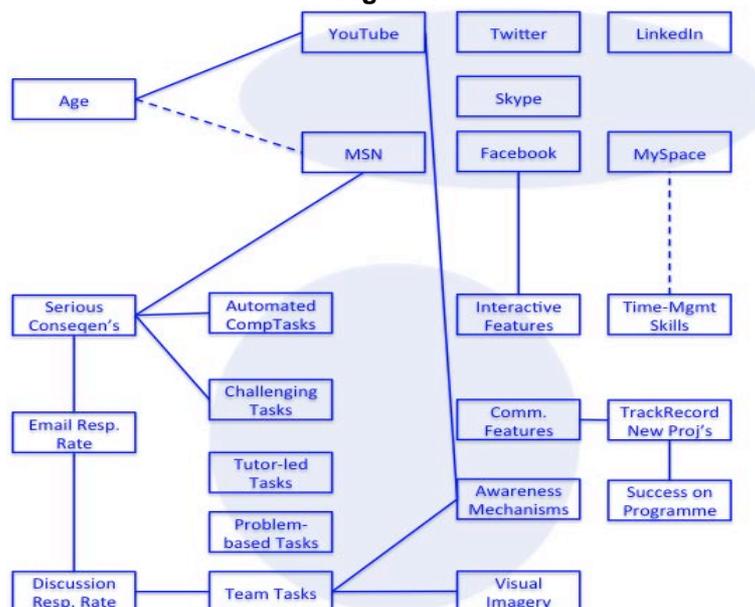
According to the correlations outlined in Figure 1, we can make some interesting observations, with regards to students' expectations.

Students who are more likely to agree that consequences of not completing the degree could be serious are understandably more demanding, i.e. they are expecting quicker responses to emails and discussion posts, more challenging tasks, but also more computer-based tasks (e.g. online quizzes).

They are also more frequent users of instant messaging tools such as MSN. All of this is indicating their need for prompt, frequent communication and work that would be worthwhile and challenging, but with instant feedback (as in online quizzes).

¹ This table was produced with a help from the help from UH Business School Statistical services

Figure 1



More confidence that a student will be successful on the programme is related to a more successful track record on taking on new projects and that is in turn, related to more importance being placed on communication features, such as emails, discussions and chats, for efficient ODL.

Those students who consider team-based collaborative tasks to be more important for effectiveness of their learning, are more likely to expect quicker responses to discussion forums, and are more likely to agree that awareness mechanisms are important for effectiveness of their learning.

Some other results include a negative correlation between the frequency of MSN use and age and positive correlation between the frequency of Facebook use and importance of interactive features for effective learning.

Poellhuber and Anderson's (2011) study above also showed the most familiar social media tools for distance learning students were social networking, video/photo sharing and blogs. Students show a higher interest in using social software that is familiar (with the exception of web conferencing which few have experienced but lots would like).

However this is not the same as saying that Facebook should be used to fulfill the need for interaction in learning environment, In fact, many studies show exactly the opposite i.e. that that students do not want to use Facebook for formal study (e.g. Madge et al 2009). These interactive features could be incorporated in the existing learning MLE and include some of the familiar Facebook- like features, such as 'share', 'like', 'comment' and others which promote interaction.

Some less obvious relationships include positive correlations between age and importance of awareness mechanisms compared to frequency of YouTube use; and negative correlation between frequency of use of MySpace and level of time-management skills. These results indicate perhaps lack of clarity of those questions or misunderstanding of what was the question about.

4.9. Expected benefits of studying online

Table F (Appendix B) shows the categories emerging from students responses to question 'What benefits do you expect to gain studying online?'

Unsurprisingly, the highest number of comments (corresponding to 43% of students) referred to flexibility offered by distance learning, with respect to location, time, and pace of study. The same benefits as for campus-based students, such as getting a degree ("recognized globally", "reputable", "from UK"), increasing the subject knowledge, improving time-management, organisation, and project management skills, enhancing career prospects or becoming "competent" were quoted by 55% of our ODL students.

Only 7% of students referred to interactions with other students and "students from all around the world" as an expected benefit from studying online. Amongst those several students referred to benefits resulting from diversity of our ODL student population.

Compared with the previous findings (section 4.1.2) on importance of interactive features for effectiveness of learning, this indicates that the interaction is a *means to an end*, rather than a *goal* for distance learning students.

4.10. Expected challenges with studying online

Table G (Appendix B) shows the categories emerging from students responses to question 'What challenges do you expect to face studying online?'

Time management, mentioned in by 28% of students' comments is clearly the biggest challenge in online studies. Another important challenge is related to lack of (face-to-face) interactions with tutors and peers, as well as learning from others through in-class interactions, debates and within study-groups. Several students specifically referred to 'lack of explanations', which are a standard part of in-class interactions as being potentially detrimental to their learning.

Challenges related to other personal attributes such as discipline, motivation and independent learning also feature less in student responses (12%), as well as those challenges related to technologies (11%). 10% of students do not expect any challenges different than those facing campus learners.

Issues resulting from the asynchronous and virtual nature of online communication were reported by 9% of students. A similar number (8%) referred to project management-related issues such as meeting deadlines and balancing studies with home disruptions.

Many of these concerns seem to have been stable over time for distance learners, as Hardy and Boaz observed in 1997 time management, motivation and self-discipline are among its core requirements.

4.11. Themes emerging from free-text comments

Other categories emerging from students' responses to final question on 'any other comments, expectations or experiences as an ODL student' include pedagogy (46%), technology (14%) institutional process (12%) etc.

These responses indicate the importance of pedagogy over any other aspect of an ODL course, in particular the need for more 'tutor presence' (or 'teaching presence' as it is known in Garrison, Anderson and Archer's (2000) Col model) through recorded video lectures, webinars and virtual classrooms.

With regards to technology, student comments relate to usability and accessibility of online resources and the need for increased level of customer support for online learners. This has implications for the University support network beyond the academic staff, something highlighted by the HEFCE studies and Lentell's work cited in the literature review.

Also important are institutional processes that enable high quality of learning experience, such as more flexibility with entry points, payments as well as more information for applicants and newly enrolled students.

The remainder of the comments were about students' experience (satisfaction with the course), their expectations based on supplementing learning with external online resources (e.g. iTunesU) or comparing to other ODL providers used in the past (e.g. Open University) and last but not least about their wish to be heard more through similar surveys. The latter comment indicates a very different attitude compared to campus-based students who are thought to suffer from the 'survey fatigue'.

5. Conclusions

The work reported here is consistent with literature in the field of ODL, which has long shown ODL students value the flexibility of studying at their own pace, as and when is convenient for them. In addition, it is evident that issues relating to time management remain a concern.

Seemingly contradictory responses with regards to cooperative versus individual learning could be attributed to differences between preferred learning styles and what is considered to be effective learning. This suggests that students regardless of their preferences, do not value cooperative tasks as a means to 'true learning', and that perhaps more should be done in educating students on the positive implications of cooperation and collaboration for their learning.

With regards to implications for learning design, the results indicate that different types of online distance learners should be considered: team-worker, independent problem-oriented individual learner and tutor-led individual learner. This implies the need for further customisation of learning designs according to different types of online learners. Equally important is the reiterated demand for increased 'tutor presence' through means such as recorded lectures, live webinars, virtual classrooms and similar.

The results also highlight some implications for induction and institutional processes related to ODL: students are requesting more information, increased levels of customer support and more flexibility with regards to payments, entry points etc. Most importantly the responses reveal a desire for a

greater sense of belonging both to the programme and the wider university and wish for their views to be heard on a more regular basis.

We reflect on Chickering and Gamson's principles and the need to respect and address diverse ways of learning, but also to enhance opportunities for social presence and social interactions for our distance learners. Awareness mechanisms are likely to play a vital role in this.

The main limitation of the study is the fact that the majority of respondents were Computer Science students, which might have skewed the data – in particular in relation to use of technology.

In our continuing research, we intend to compare students' expectations with those of academics and other staff involved in distance learning programmes and also to try to identify factors influencing performance of students on distance learning programmes.

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Appendix A Factors corresponding to frequency of use of online applications

To further reduce the complexity of the 'correlation graph' (Figure 1) an additional principal component analysis (with orthogonal rotation varimax) was conducted on 8 variables corresponding to frequency of use of various online applications. The KMO measure verified the sampling adequacy for the analysis KMO = 0.643 (mediocre, according to Field, 2009) and all KMO values for individual items were >0.53, which is above the acceptable limit of 0.5 (Field, 2009).

Three components in combination explained the cumulative variance of 39.13%. The table below shows the factor loadings after rotation. The items that cluster on the same factor suggest that Factors 1 and 2 represent Business and Social Networking applications respectively, while the interpretation for Factor 3 is less clear, as it corresponds to a single variable.

Table E Rotated Factor Matrix^a

	Factor		
	1	2	3
@19cLinkedIn	.579		
@19eSkype	.555		
@19aTwitter	.537		
@19dMySpace			
@19gGoogleTalk			
@19bFacebook		.728	
@19hYouTube		.506	
@19fMSN			.862

Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization; a. Rotation converged in 11 iterations.

Appendix B Categories emerging from open-ended questions

Tables F and G show the categories emerging from students responses to the open ended questions. and ordered according to decreasing number of related comments (item count). The Students% column shows a percentage of students (out of N=89) who provided a comment in a specific category.

Table F Expected benefits

Category	Item Count	Item Count%	Students %
Flexibility	38	36%	43%
Degree	20	19%	22%
Subject knowledge	12	11%	13%
Skills	9	8%	10%
Career prospects	6	6%	7%
Interactions with students	6	6%	7%
Easy access to learning resources	5	5%	6%
Cost savings	4	4%	4%
Same as for other students	2	2%	2%
Respect from others	2	2%	2%
Competence	1	1%	1%
Access to latest technologies	1	1%	1%
Research	1	1%	1%
Total	107	100%	

Table G Expected Challenges

Category	Item Count	Item Count%	Students %
Time management	25	23%	28%
Lack of interactions	24	22%	27%
Other personal attributes	11	10%	12%
Technology	10	9%	11%
Nothing	9	8%	10%
Communication	8	7%	9%
Project management	7	7%	8%
Assessment	3	3%	3%
Fees	3	3%	3%
Subject	3	3%	3%
Academic standards	1	1%	1%
Accessibility	1	1%	1%
Employers	1	1%	1%
Support	1	1%	1%
Total	107	100%	